**SPRING 2022** **The Chemistry of Art** **CHEM 176**
TENTATIVE!!!


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The Chemistry of Art is a class taught in collaboration between the Department of Chemistry at Rice University and the Museum of Fine Arts Houston (MFAH). As such, it provides a unique opportunity for students to understand and experience the role that chemistry and science in general plays in the creation, preservation, restoration and authentication of art objects.

**Please read carefully!** Normally the sessions with the MFAH staff have been held at the MFAH. Because of the pandemic, the conservation facilities at the MFAH are under reduced access and some lectures given by the conservators will be done remotely. There will be no in-person meeting at Rice on those days. If the meetings take place at the MFAH, you will be responsible for getting there on your own. On those days, class will begin at 11:00 AM rather than 10:50 AM in order to allow you more time to get there between classes. It is best not to schedule activities starting before 12:30 PM on those days to allow for travel time back to Rice. **It is important for all students to be on time for meetings at the MFAH as these cannot be done on Zoom** and they are an very important part of the class. Of course, if the University decides that classes will be held remotely, I will send out Zoom links ahead of time for those sessions. Otherwise, my intention is to hold the class as fully in-person (except for the MFAH sessions as noted).

I will plan to have in-person office hours after class on Tu/Th. I can also schedule remote office hours during those time periods and others by appointment. **Please note that the course schedule may be subject to change on short notice to accommodate the needs of the MFAH staff and the changing COVID situation.**

The course grade will be based upon the following:

- Class attendance and participation (10%)
- Three 1-hr semester exams (20% each)
- Out of class assignments (10%)
- Final exam (20%)

Attendance during the lecture classes held at Rice is strongly recommended since there is no standard text available for the class. The museum conservators will present the material covered either at the museum or remotely on the dates listed in the syllabus. It is best to be present during the MFAH sessions time so that you can ask questions directly of the conservators. The museum staff who will be participating in this class include

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| Per Knutås | Head of Conservation |
| Maite Leal | Senior Conservator, Paintings |
| Jane Gilles | Senior Conservator, Objects and Sculpture |
| Trevor Boyd | Associate Conservator, Decorative Arts |
| Toshi Koseki | Senior Conservator, Photographs |
| Tina Tan | Conservator, Works on Paper |
| Corina Rogge, Ph.D. | Conservation Research Scientist |

All of us involved in this project are very excited about the course, and we hope that you are too!!!

**Disability Resource Center**

Any student with a disability requiring accommodations in this course should contact the Disability Resource Center (Allen Center, Room 111, adarice@rice.edu, x5841). That office will provide a letter outlining the accommodations to be made based upon your situation. Please relay that letter and any other pertinent information to the me on or before January 31, 2022.

**Honor Code**

All students will be held to the standards of the Rice Honor Code, a code that you pledged to honor when you matriculated at this institution. If you are unfamiliar with the details of this code and how it is administered, you should consult the Honor System Handbook at http://honor.rice.edu/honor-system-handbook/. This handbook outlines the University's expectations for the integrity of your academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process.

**Syllabus Change Policy**

This syllabus is only a guide for the course, especially given the circumstances of the COVID-19 pandemic, and may change with short notice. Please check your email regularly for any updates, especially to meetings scheduled with the MFAH staff.

**Schedule**, *tentative*

**Week 1**

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| January 11 | Creating and Perceiving Objects of Art<br>The Elements: Periodic Table<br>Metals and Alloys: Oxidation and Reduction |
| January 13 | Introduction to the Conservation of Art at the MFAH<br>(MFAH, Per Knutås) |

**Week 2**

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| January 18 | Oxidation and Reduction, continued:<br>The Formation of Compounds |
| January 20 | Crystalline and Amorphous Solids: Glass, Ceramics and Stone |

**Week 3**

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| January 25 | Sculpture (MFAH, Jane Gilles) |
| January 27 | Gems and Minerals |

**Week 4**

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|---|---|
| February 1 | Gems and Minerals |
| February 3 | The Interaction of Light with Matter: Techniques for Studying Art |

**Week 5**

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| February 8 | **Exam 1** |
| Feb 10 | **Spring Recess, no class** |

**Week 6**

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| February 15 | Pigments: Inorganic Pigments |

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| February 17<br>` | Pigments: Inorganic Pigments, continued,<br>Organic Compounds and Functional Groups |

**Week 7**

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| February 22 | Organic Pigments |
| February 24 | Polymer Chemistry<br>Binders: Tempera, Oils, Acrylics, etc. |

**Week 8**

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|---|---|
| March 1 | Paintings (MFAH, Maite Leal) |
| March 3 | Textiles and Fabrics |

**Week 9**

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| March 8 | Textiles and Fabrics, Dyeing |
| March 10 | **Exam 2** |

**March 12 - 20** **SPRING BREAK, No Class**

**Week 10**

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| March 22 | Wood |
| March 24 | Wood (MFAH, Trevor Boyd) |

**Week 11**

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| March 29 | Paper and Inks |
| March 31 | Works on Paper: Prints, Drawings and other works using Paper |

(MFAH, remote, Tina Tan)

**Week 12**

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| April 5 | Photography |
| April 7 | Case Studies (MFAH, Cory Rogge, pending) |

**Week 13**

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|---|---|
| April 12 | Photography |
| April 14 | Photography (MFAH, remote, Toshi Koseki) |

**Week 14**

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| April 19 | Retrospective |
| April 21 | **Exam 3** |

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| April 22 | **Last Day of Classes** |

**Final Exam Period**

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| TBD | **Final Exam to be Scheduled by the Registrar** |

## Learning Objectives

The learning objectives for the course include:

Understand atomic and molecular structure and bonding including

- elements
- metals and alloys
- inorganic compounds
- organic compounds
- ionic compounds
- covalent compounds
- simple and complex ions

Understand the nature of electromagnetic radiation and energy

Understand the fundamental types of chemical reactions and equilibria:

- oxidation/reduction
- acid-base
- ionic displacement
- combustion
- solubility
  polymerization - radical chain, step-growth, crosslinking, etc.
- etc.

Understand how electromagnetic radiation interacts with chemical compounds

Principles behind the techniques for analyzing chemical compounds (e.g., spectroscopy)

Survey pigments used in paintings, both inorganic and organic

Understand the chemical structure of textiles (cotton, linen, silk, wool, manmade polymers, etc.), wood and paper

Understand the fundamentals of oxidation-reactions and photochemistry that underlie chemical-based photography

Understand the scientific method as it relates to the authentication, restoration, preservation and storage/display of Art objects

Be able to discuss the ethical considerations that go into the conservation of art objects